

REMARKS

Applicant has carefully reviewed the Office Action mailed October 22, 2009 and offers the following remarks.

Claims 1-4, 6-12, 14-17, and 19-25 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,493,331 B1 to Walton et al. (hereinafter "Walton"). Applicant respectfully traverses. For a reference to be anticipatory, the reference must disclose each and every claim element. Further, the elements of the reference must be arranged as claimed. M.P.E.P. § 2131. The requirement that each and every element be disclosed in the manner claimed is a rigorous standard that the Patent Office has not met in this case.

Before addressing the rejection, Applicant provides a brief summary of the embodiments disclosed in the current application. The disclosed embodiments provide a technique for scheduling data, and in particular, scheduling real-time or voice data for transmissions during a transmit time interval in a multi-carrier communication environment, such as an OFDM communication environment. For each transmit time interval, channel condition indicia for multiple users is determined, and an iterative scheduling process is then implemented based in part on the channel condition indicia. The iterative scheduling initially pre-assigns select OFDM tones for each of the remaining users that have not been permanently assigned tones for the given transmit time interval. The OFDM tones assigned to each user may be assigned in groups corresponding to channels. These channels define available tones throughout the transmit time interval. The transmit time interval is broken into time segments, referred to as blocks, wherein all of the available sub-carriers in the available OFDM spectrum are repeated for each block. Each sub-carrier in the resulting time-frequency continuum is referred to as a tone. If the tones are grouped into channels, channels may include tones over any number of frequencies or blocks. After the iterative scheduling initially pre-assigns select OFDM tones for each of the remaining users that have not been permanently assigned tones for the given transmit time interval, the remaining user having the least favorable channel conditions is selected as an active user. The newly selected active user is then permanently assigned the select OFDM tones that were initially pre-assigned to that particular user. The permanently assigned OFDM tones are removed from consideration, and the process is repeated until all the remaining users are permanently assigned unique OFDM tones. At this point, scheduling may be initiated.

Claim 1 is representative and recites a method for scheduling data for transmission during a transmit time interval in a multi-carrier communication environment comprising:

determining channel condition indicia for a plurality of users;

in an iterative manner:

pre-assigning select OFDM tones for each remaining user of the plurality of users that has not been permanently assigned tones for the transmit time interval;

selecting a remaining user having least favorable channel conditions as an active user; and

permanently assigning to the active user the select OFDM tones pre-assigned to the active user, wherein once the select OFDM tones are permanently assigned to the active user, the active user is no longer a remaining user.

Claim 14 is an independent system claim that recites similar limitations as the limitations of claim 1.

First, Walton does not teach “determining channel condition indicia for a plurality of users,” as recited in claims 1 and 14. The Patent Office alleges that column 54, lines 54-56 of Walton teaches this limitation (Office Action mailed October 22, 2009, p. 3). Applicant respectfully disagrees. Walton discloses that “[a]fter the data transmissions are scheduled, resource allocation processor 1430 directs data for the scheduled transmission to be demultiplexed by demultiplexer 1510 into their respective assigned channels ... [and] further directs the processing of these transmissions based on the determined link quality.” (Walton, col. 54, lines 50-56). This is different from the claimed invention in at least two ways. First, in the claimed invention, the channel condition indicia is determined for a **plurality of users**. Walton merely discloses determining the quality of a single link. Second, in the claimed invention, the channel condition indicia is determined for a plurality of users and then the iterative process of pre-assigning and permanently assigning select OFDM tones based on the determined channel conditions is carried out for the scheduling of the data for transmission. In Walton, the data transmissions are scheduled first and then processed based on the link quality. Thus, the cited portion of Walton does not teach “determining channel condition indicia for a plurality of users,” and then using the channel conditions to carry out the claimed iterative process to schedule the data for transmission. Claims 1 and 14 are therefore not anticipated by Walton.

Walton also does not teach the iterative process claimed in independent claims 1 and 14. First, Walton does not teach that the pre-assigning, selecting, and permanent assigning steps are all done “in an iterative manner,” as required by claims 1 and 14. The Patent Office cites to column 19, lines 50-55 of Walton as allegedly teaching this limitation (Office Action mailed October 22, 2009, p. 3). The cited portion of Walton does not relate to the pre-assigning, selecting, and permanent assigning steps of the claimed invention. The cited portion of Walton relates to addressing the imbalance in effective link margins (Walton, col. 19, lines 43-55). The imbalance in effective link margins is reduced by iteratively computing the back-off factors. The cells and channels having higher effective link margins will have their transmit powers reduced accordingly. *Id.* Thus, Walton discloses an iterative process, but the iterative process is computing back-off factors, not pre-assigning OFDM tones, selecting a remaining user having least favorable channel conditions as an active user, and permanent assigning OFDM tones. Accordingly, Walton does not teach the iterative process of the claims, which recites that the pre-assigning, selecting, and permanent assigning steps are all done “in an iterative manner.” Claims 1 and 14 are therefore patentable for this additional reason.

Walton also fails to teach “pre-assigning select OFDM tones for each remaining user of the plurality of users that has not been permanently assigned tones for the transmit time interval,” as recited in claims 1 and 14. The Patent Office asserts that column 53, lines 5-21 teaches this limitation (Office Action mailed October 22, 2009, p. 3). Applicant respectfully disagrees. The cited portion of Walton discloses that a data processor “can assign the available resources such that the system goals of high performance and high efficiency are achieved.” (Walton, col. 53, lines 6-9). Walton discloses that each channel stream is assigned to its respective time slot(s), sub-channel(s), and antenna(s) (Walton, col. 53, lines 11-14). However, the cited portion of Walton does not disclose any “pre-assigning,” nor does the cited portion of Walton disclose pre-assigning **select OFDM tones**, as recited by the claimed invention. Claims 1 and 14 are thus patentable for this additional reason.

Further, Walton does not teach “selecting a remaining user having least favorable channel conditions as an active user,” as recited in claims 1 and 14. The Patent Office cites to Figure 11, block 1114 as allegedly teaching this limitation (Office Action mailed October 22, 2009, p. 4). Applicant respectfully disagrees. In the claimed invention, the following steps are performed in an iterative manner:

pre-assigning select OFDM tones for each remaining user of the plurality of users that has not been permanently assigned tones for the transmit time interval;

selecting a remaining user having least favorable channel conditions as an active user; and

permanently assigning to the active user the select OFDM tones pre-assigned to the active user, wherein once the select OFDM tones are permanently assigned to the active user, the active user is no longer a remaining user.

Thus, in the claimed invention, in each iteration, the remaining user having the **least favorable** channel conditions is selected as an active user and then the select OFDM tones pre-assigned to the active user are permanently assigned to the active user. The cited portion of Walton discloses the opposite. Walton discloses that the **best** possible channel is assigned to the highest priority user, and then the next best channel is assigned to the next highest priority user (Walton, col. 43, lines 15-23; see also Figure 11). Walton therefore does not teach “selecting a remaining user having **least favorable channel conditions** as an active user,” as recited in claims 1 and 14. Claims 1 and 14 are thus patentable for this additional reason.

Moreover, Walton is silent as to pre-assigning select OFDM tones and then, after selecting a remaining user having least favorable channel conditions as an active user, permanently assigning to the active user the select OFDM tones pre-assigned to the active user, as recited in the claimed invention. In the claimed invention, the pre-assigning, selecting, and permanent assigning steps are done in an iterative manner until all users have been permanently assigned the select OFDM tones. In particular, in each iteration, the remaining user that has the least favorable channel conditions is selected as an active user and is permanently assigned the select OFDM tones pre-assigned to the active user. Walton does not disclose this limitation. Walton does not teach the concepts of pre-assigning select OFDM tones, and then a later step of permanently assigning the pre-assigned select OFDM tones. There is no teaching in Walton that multiple iterations are performed in which the remaining user that has the least favorable channel conditions is selected as an active user and is permanently assigned the select OFDM tones pre-assigned to the active user **in each iteration**, as recited in the claimed invention. Claims 1 and 14 are thus patentable for this additional reason.

Claims 1 and 14 are patentable for the reasons set forth above. Claims 2-4 and 6-12 depend from claim 1 and recite all of the limitations of claim 1. Claims 15-17 and 19-25 depend

from claim 14 and recite all of the limitations of claim 14. Claims 2-4, 6-12, 15-17, and 19-25 are thus patentable for at least the same reasons set forth above with respect to claims 1 and 14.

In addition, claims 2 and 15 are separately patentable. Claims 2 and 15 recite that “the select tones permanently assigned to active users are no longer available for pre-assignment to the remaining users.” Walton does not teach this feature. The Patent Office cites to column 53, lines 36-40 of Walton as allegedly teaching this limitation (Office Action mailed October 22, 2009, pp. 4-5). Applicant respectfully disagrees. Applicant has reviewed the cited portion of Walton and finds no teaching that the select tones that are permanently assigned to active users are no longer available for pre-assignment to the remaining users. In fact, Walton is silent as to pre-assigning and permanent assigning of select OFDM tones. Claims 2 and 15 are separately patentable for this additional reason.

Claims 5, 13, 18, and 26 were rejected under 35 U.S.C. § 103(a) as being unpatentable to Walton¹ in view of U.S. Patent No. 6,608,835 B2 to Geile et al. (hereinafter “Geile”). Applicant respectfully traverses. When rejecting a claim under § 103, the Patent Office must either show that the prior art references teach or suggest all limitations of the claim or explain why the difference(s) between the prior art and the claimed invention would have been obvious to one of ordinary skill in the art. *KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 418, 82 U.S.P.Q.2d (BNA) 1385 (2007). The gap between the prior art and the claimed invention may not be “so great as to render the [claim] nonobvious to one reasonably skilled in the art.” *Dann v. Johnston*, 425 U.S. 219, 230, 189 U.S.P.Q. (BNA) 257, 261 (1976). In this case, the Patent Office has failed to show where each and every limitation of the claims is taught or suggested by the prior art. Further, for those limitations of the claims that are not taught or suggested by the prior art, the Patent Office has failed to explain why those limitations would have been obvious to one of ordinary skill in the art.

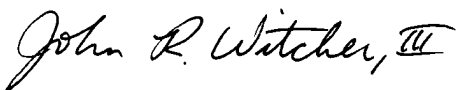
Claims 5 and 13 depend from claim 1 and recite all of the limitations of claim 1. Claims 18 and 26 depend from claim 14 and recite all of the limitations of claim 14. As set forth above, Walton does not teach each and every limitation of claims 1 and 14. Geile does not cure the deficiencies of Walton in this regard. Claims 5, 13, 18, and 26 are thus patentable for at least the same reasons set forth above with respect to claims 1 and 14.

¹ With respect to the rejection of claims 5, 13, 18, and 26, the Patent Office cited U.S. Patent Application Publication No. 2005/0111462 A1 to Walton et al., but Applicant believes that the Patent Office intended to cite to U.S. Patent No. 6,493,331 to Walton et al. and responds accordingly.

The present application is now in condition for allowance and such action is respectfully requested. The Examiner is encouraged to contact Applicant's representative regarding any remaining issues in an effort to expedite allowance and issuance of the present application.

Respectfully submitted,

WITHROW & TERRANOVA, P.L.L.C.

By: 

John R. Witcher, III
Registration No. 39,877
100 Regency Forest Drive, Suite 160
Cary, NC 27518
Telephone: (919) 238-2300

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